



The 10th workshop on
**Boundary Element Methods,
Integral Equations, and
Related Methods in TAIWAN**

November 2 2019
Department of Engineering Science
National Cheng Kung University

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大會議程

BEM course

日期：2019年11月1號(五)

地點：國立成功大學工程科學系所 B1 越生講堂

Time	Program
1400-1450	Lecture 1: Complex algebra & Clifford algebra
1450-1500	Break
1500-1550	Lecture 2 : Clifford analysis
1550-1600	Break
1600-1700	Lecture 3: Boundary integral equations and boundary element methods

Conference day

日期：2019年11月2日(六)

地點：國立成功大學工程科學系所 B1 越生講堂

Time	Program
0830-1630	Registration
0900-0915	Opening
0915-0940	Speaker: Jeng-Tzong Chen Title: Overview of Taiwan BEM 1~10
0940-0950	Photo session
0950-1010	Break
1010-1035	Speaker: Hung-Tsai Huang Title: Analysis of the method of fundamental solutions for the Helmholtz equation
1035-1100	Speaker: Lin-Tian Luh Title: Collocation and shape parameter
1100-1125	Speaker: Wen-Shinn Shyu Title: The progress of solving scattering problems by hybrid method
1125-1150	Speaker: Dean Chou Title: Using the poroelastic model to explore dynamic Mandel's problem via the finite element method

1150-1250	Lunch
1250-1315	Speaker: Wei-Fan Hu Title: Electrohydrodynamic Quincke rotation for a solid particle
1315-1340	Speaker: Chun-Hao Teng Title: Seeking inverse operators for pseudospectral differentiation matrices by stepwise integrations and low-rank updates
1340-1405	Speaker: Jia-Wei Lee Title: Null-field boundary integral equation method for solving SH-wave scattering by a circular hole buried in semi-infinite functionally graded materials
1405-1430	Speaker: Ching-Sen Wu Title: Simulations of gravity currents over different topography in a channel
1430-1455	Break
1455-1520	Speaker: Shihchung Chiang Title: Optimization in transition between two dynamic systems governed by a class of weakly singular integro-differential equations
1520-1545	Speaker: Tzon-Tzer Lu Title: Three types of Adomian solutions for Burgers' equations
1545-1610	Speaker: Hsueh-Chen Lee Title: Least-square finite element method for viscoelastic fluid flows through a transverse slot channel
1610-1635	Speaker: Chia-Ming Fan Title: Developments and applications of the localized method of fundamental solutions
1635-1645	Closing ceremony
1645-1710	Speaker: De-Shin Liu Title: 2D dynamics infinite element modeling approach to membrane vibration problems.
1710-1735	Speaker: Po-Jen Shih Title: Corneal biomechanics for disease diagnosis
1800-2030	Banquet



1545-1610

Least-square finite element method for viscoelastic fluid flows through a transverse slot channel

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In the work, we develop a least-squares finite element method for linear Phan-Thien–Tanner (PTT) viscoelastic fluid flows; in contrast to the Newtonian flows, the problems are associated with fluid viscosity and elasticity. We consider the least-squares finite element method with stabilized weights for the viscoelastic model and prove that the LS approximation converges to the linearized solutions of the linear PTT model. An a posteriori error estimator of the LS functional is used for an adaptive weight iteration approach. This approach improves mass conservation and yields convergence at high Weissenberg numbers when low order basis functions. For numerical experiments, we first consider the flow through a planar channel to illustrate our theoretical results. The LS method is then applied to a flow through the slot channel with two depth ratios and the effects of physical parameters are discussed. Numerical solutions of the channel problem indicate that flow characteristics of the viscoelastic polymer solution are described by the results obtained using the method. Furthermore, we present the hole pressure for various Weissenberg numbers, and compare with that derived from the Higashitani–Pritchard (HP) theory.